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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/078,020	02/15/2002	Won K. Choi	END920020007US1	4945

7590 10/02/2003

IBM Corporation
IP Law Dept. N50/040-4
1701 North St.
Endicott, NY 13760

EXAMINER	
ZIMMERMAN, JOHN J	

ART UNIT	PAPER NUMBER
1775	

DATE MAILED: 10/02/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/078,020	CHOI ET AL.	
	Examiner	Art Unit	
	John J. Zimmerman	1775	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____ .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) 1-79 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-79 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on 15 February 2002 is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 3,5 .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other:

FIRST OFFICE ACTION

Information Disclosure Statement

1. The information disclosure statements received February 15, 2002 and April 8, 2002 have been considered. Initialed forms PTO-1449 are enclosed with this Office Action.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.
>
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.
>
> The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

3. Claims 1-8, 29-35, 69 and 76-79 are rejected under 35 U.S.C. 102(b) as being anticipated by Sakai (U.S. Patent 6,077,477).

4. Sakai discloses a lead-free solder alloy containing 92-97 wt.% Sn, 3.0-6.0 wt.% Ag and 0.1-2.0 wt.% Cu wherein the solder is solidified at a temperature gradient of 5°C./sec to 15°C./sec (e.g. see column 2, lines 20-30, 41-52). The cooling rate of Sakai would meet the conditions of the applicant's claims. Patent and Trademark Office can require applicants to prove that prior art products do not necessarily or inherently possess characteristics of claimed products where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes; burden of proof is on applicants where rejection based on inherency under 35 U.S.C. § 102 or on prima facie obviousness under 35 U.S.C. § 103, jointly or alternatively, and Patent and Trademark Office's inability to manufacture products or to obtain and compare prior art products evidences fairness of this rejection, *In re Best, Bolton, and Shaw*, 195 USPQ 431 (CCPA 1977). The amounts of Ag and Cu in the solder are taught by Sakai with sufficient specificity as to anticipate the rejected claims. See MPEP 2131.03.

5. Claims 1-6, 9-15, 17-21, 29-30, 32-33, 36-38, 40, 42-43, 45, 50-54, 56-61, 69-71 and 73-77 are rejected under 35 U.S.C. 102(b) as being anticipated by Tanaka (Japanese publication 2001-138088).

6. Tanaka discloses a lead-free solder alloy containing Sn, 2.6 wt.% Ag and 0.6 wt.% Cu (e.g. see paragraph [0024]). The silver content in the alloy is low enough to suppress formation of Ag_3Sn plates regardless of the cooling rate. Patent and Trademark Office can require applicants to prove that prior art products do not necessarily or inherently possess characteristics of claimed products where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes; burden of proof is on applicants where rejection based on inherency under 35 U.S.C. § 102 or on prima facie obviousness under 35 U.S.C. § 103, jointly or alternatively, and Patent and Trademark Office's inability to manufacture products or to obtain and compare prior art products evidences fairness of this rejection, *In re Best, Bolton, and Shaw*, 195 USPQ 431 (CCPA 1977). The amounts of Ag and Cu in the solder are taught by Tanaka with sufficient specificity as to anticipate the rejected claims. See MPEP 2131.03.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. Claims 11-17, 20-28, 36-56, 59-68 and 70-73 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's disclosure of the prior art in view of Sakai (U.S. Patent 6,077,477).

9. Applicant discloses that chip carriers in the prior art may be coupled to a circuit card by a ball grid array comprising BGA solder balls and that lead-free solders are now beginning to be used commercially. Applicant discloses, however, that the lead-free solders have adverse physical characteristics which may cause reliability problems and that there is a need for a reliable lead-free solder for use in solder ball and chip or chip carrier assemblies (e.g. see applicant's specification page 1, lines 6-14). Therefore, there is established a motivation to find an acceptable and reliable lead-free solder for electronic assemblies in the prior art. To this end, Sakai discloses a lead-free solder alloy containing 92-97 wt.% Sn, 3.0-6.0 wt.% Ag and 0.1-2.0 wt.% Cu which is solidified at a temperature gradient of 5°C./sec to 15°C./sec (e.g. see column 2, lines 20-30, 41-52) so that excellent mechanical strength and thermal fatigue resistance can be achieved. The cooling rate of the solder of Sakai would meet the conditions of the applicant's claims. Sakai also discloses that his invention may be used in electronic circuit boards mounting electronic components (e.g. see column 1, lines 14-23). In view of Sakai's disclosure that his lead-free solder composition has excellent mechanical strength and thermal fatigue resistance suitable for electronic assemblies, it would have been obvious to one of ordinary skill in the art to use Sakai's solder in the admitted prior art chip carriers, circuit cards and ball grid arrays because there is an established motivation to find lead-free solders suitable for electronic assemblies and the properties of Sakai's lead-free solder meets the requirements of excellent mechanical strength and thermal fatigue resistance that would be recognized by one of ordinary skill in the art as excellent for lead-free solders for use in electronic assemblies (e.g. the admitted prior art chip carriers, circuit cards and ball grid arrays).

10. Regarding the use of applicant's admitted prior art in the rejection, it is axiomatic that consideration of the prior art cited by the examiner must, of necessity, include consideration of the admitted state of the art found in applicant's specification, *In re Davis*, 305 F.2d 501, 134 USPQ 256 (CCPA 1962); *In re Hedges*, 783 F.2d 1038, 228 USPQ 685 (Fed. Cir. 1986). Admitted knowledge in the prior art may be used in determining patentability of the claimed subject matter, *In re Nomiya*, 509 F.2d 566, 184 USPQ 607 (CCPA 1975).

11. Regarding whether the solder composition of Sakai meets the conditions of the claims, Patent and Trademark Office can require applicants to prove that prior art products do not necessarily or inherently possess characteristics of claimed products where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes; burden of proof is on applicants where rejection based on inherency under 35 U.S.C. § 102 or on prima facie obviousness under 35 U.S.C. § 103, jointly or alternatively, and Patent and Trademark Office's inability to manufacture products or to obtain and compare prior art products evidences fairness of this rejection, *In re Best, Bolton, and Shaw*, 195 USPQ 431 (CCPA 1977).

12. Claims 16, 22-24, 26-28, 39, 44, 46, 48-49, 55, 62-64, 67-68 and 72 are rejected under 35 U.S.C. 103(a) as being unpatentable over applicant's disclosure of the prior art in view of Tanaka (Japanese publication 2001-138088).

13. Applicant discloses that chip carriers in the prior art may be coupled to a circuit card by a ball grid array comprising BGA solder balls and that lead-free solders are now beginning to be used commercially. Applicant discloses, however, that the lead-free solders have adverse physical characteristics which may cause reliability problems and that there is a need for a reliable lead-free solder for use in solder ball and chip or chip carrier assemblies (e.g. see applicant's specification page 1, lines 6-14). Therefore, there is established a motivation to find an acceptable and reliable lead-free solder for electronic assemblies in the prior art. To this end, Tanaka discloses a lead-free alloy solder balls containing Sn, 2.6 wt.% Ag and 0.6 wt.% Cu (e.g. see paragraph [0024]) suitable in properties for joining silicon chips and printed circuit boards (e.g. see paragraph [0026]). The silver content in the alloy is low enough to suppress formation of Ag_3Sn plates regardless of the cooling rate. In view of Tanaka's disclosure that his lead-free solder ball composition is suitable for joining chips to printed circuit boards, it would have been obvious to one of ordinary skill in the art to use Tanaka's solder ball compositions in the admitted prior art chip carriers, circuit cards and ball grid arrays because there is an established motivation to find lead-free solders suitable for such electronic assemblies and the properties of Tanaka's lead-free solder balls apparently meets the requirements of lead-free solders for use in electronic assemblies (e.g. the admitted prior art chip carriers, circuit cards and ball grid arrays).

14. Regarding the use of applicant's admitted prior art in the rejection, it is axiomatic that consideration of the prior art cited by the examiner must, of necessity, include consideration of the admitted state of the art found in applicant's specification, *In re Davis*, 305 F.2d 501, 134 USPQ 256 (CCPA 1962); *In re Hedges*, 783 F.2d 1038, 228 USPQ 685 (Fed. Cir. 1986).

Admitted knowledge in the prior art may be used in determining patentability of the claimed subject matter, *In re Nomiya*, 509 F.2d 566, 184 USPQ 607 (CCPA 1975).

15. Regarding whether the solder composition of Tanaka meets the conditions of the claims, Patent and Trademark Office can require applicants to prove that prior art products do not necessarily or inherently possess characteristics of claimed products where claimed and prior art products are identical or substantially identical, or are produced by identical or substantially identical processes; burden of proof is on applicants where rejection based on inherency under 35 U.S.C. § 102 or on prima facie obviousness under 35 U.S.C. § 103, jointly or alternatively, and Patent and Trademark Office's inability to manufacture products or to obtain and compare prior art products evidences fairness of this rejection, *In re Best, Bolton, and Shaw*, 195 USPQ 431 (CCPA 1977).

Conclusion

16. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The additionally cited references serve to further establish the level of ordinary skill in the art at the time the invention was made.

17. Any inquiry concerning this communication or earlier communications from the examiner should be directed to John J. Zimmerman whose telephone number is (703) 308-2512. The examiner can normally be reached on 8:30am-5:00pm, M-F. The fax phone number for the organization where this application or proceeding is assigned is (703) 872-9306. Any inquiry of

a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

John J. Zimmerman
Primary Examiner
Art Unit 1775

jjz
September 17, 2003